PROJECT NUMBER: 1702
PROJECT TITLE: Optical Processing and Aerosol Research
PROJECT LEADER: K. A. Cox
PERIOD COVERED: April, 1988

I. INDIVIDUAL CIGARETTE INSPECTION (D. Lowitz)

A. **Objective**: Develop methods for the inspection of individual cigarettes on a making machine.

B. **Results**: A CIM 7401 rod monitoring head and ancillary apparatus were obtained to permit setting up a test unit that is independent of the AccuRay 7000 module. With the help of A. Burton, the electronic portions of the test table were mounted and made operational.

C. **Plans**: Complete the CIM 7401 test unit by fabricating a sampling system. Interface the unit's output to a computer in order to permit the calculation and evaluation of potential optical or electronic filter functions. Determine the resolution limits of the CIM 7401 and the need for improvements utilizing acousto-optic cells.

II. OPTICAL PACK INSPECTION, EXPERIMENTAL (C. Harward)

A. **Objective**: Evaluate the Global Holonetics SMART CAMERA (SC). Determine its effectiveness in discriminating between good and defective packs.

B. **Results**: A video frame grabber and an optical disk drive were installed in a PC to allow a video image library of both good and defective cigarette packs to be collected. Global Holonetics personnel have modified the system so that video images can be recalled from the library and sent to the SC. This allows the SC to be shown the same set of images repeatedly in order to monitor its performance as a function of time. Two sets of images of cigarette packs have been collected for use in the evaluation of the SC.

III. OPTICAL CORRELATOR DEVELOPMENT (C. Harward)

A. **Objective**: Construct and test an optical correlator for pack inspection.

B. **Results**: An optical system was set up to fabricate an optical correlation filter. A specially modified LCD TV was used as a spatial light modulator (SLM) to encode a video image onto a laser beam. The corresponding filter was then obtained by recording the interference pattern produced between the encoded beam and a reference beam on a glass photographic plate. When this filter was used in an optical correlator, a small intense spot was

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observed in the center of the output plane when the corresponding image was displayed on the SLM. The intensity was observed to be reduced when other images were displayed.

C. **Plans**: Improve the technique used to produce the correlation filter. Determine the relative sensitivity of the correlation output to defective images and to acceptable variations in good images.

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